

*State of Missouri*

*Regulatory Impact Report*  
*for Proposed Rule Amendment*  
*10 CSR 23-5.050—Heat Pump Construction Code*



**Missouri Department of Natural Resources**  
Geological Survey and Resource Assessment Division  
Geological Survey Program  
Wellhead Protection Section

February, 2006

Missouri Department of Natural Resources  
**Regulatory Impact Report**

Program: Water Protection Program

Rule number 10 CSR 23-3.100 & 10 CSR 23-5.050 Rule Title Special Areas & Heat  
Pump Construction Code

Type of rule: Amendment

Nature of the rule (*Select as many as apply*)

Affects environmental conditions  
Prescribes environmental standards

Submitted by

\_\_\_\_\_  
*(Name), Program director* Date \_\_\_\_\_

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**Approval of the Final Regulatory Impact Report**

\_\_\_\_\_  
*(Name), Legal Counsel* Date \_\_\_\_\_

\_\_\_\_\_  
*(Name), Division Director* Date \_\_\_\_\_

1. Does the rulemaking adopt rules from the US Environmental Protection Agency or rules from other applicable federal agencies without variance?

No

2. A report on the peer-reviewed scientific data used to commence the rulemaking process.

USDOE, MDNR and USCOE assessments indicated TCE, nitrate, DNT, TNT, DNB, NB and uranium (chemical and radiological) impact that exceeds MCLs or ALs in the groundwater aquifer west the city of Weldon Spring. Drilling wells in aquifers contaminated with these constituents must be done using the best available technology. Therefore, more stringent drilling techniques must be used to prevent spreading contamination downward into clean aquifers and to minimize human exposure.

In areas of dissolved-phase contamination, it is possible to construct wells that both provide safe drinking water and are protective of aquifers. In such areas, wells should be drilled in such a manner that the casing penetrates the entire zone(s) of dissolved-phase contamination, and ideally, extend into an underlying confining unit (impermeable geologic layer). The annular space around the casing should then be full-length grouted. Such a methodology is standard industry practice for sealing out contamination. This methodology is required by the Missouri Well Installation Board for sealing out contamination in several areas of Missouri. For instance, Sensitive Area C (10 CSR 23-3.100 (3)), which encompasses all of Greene County and northern Christian County, requires all domestic water wells be cased through the upper aquifer (Springfield Plateau Aquifer) and confining unit (Northview Shale) in order to seal out pervasive bacterial and other contamination. Special Area 2 (10 CSR 23-3.100 (5)), which encompasses all of Jasper and Newton Counties, mandates a similar approach for sealing out widespread heavy metal and chlorinated hydrocarbon contamination. It is proposed that this methodology be used in areas of dissolved-phase contamination in this rulemaking.

The constituents of concern listed above at the subject groundwater aquifers are not at levels that could cause acute toxicities to humans; however, chronic exposure (primarily through ingestion or the oral route) may lead to adverse effects or toxicity to various organs (i.e., kidney from the chemical effects of uranium, splenic toxicity from DNB, liver toxicity from TNT, kidney and liver effects from NB, and neurotoxicity from 2,4-DNT) and an increased probability of developing cancer over a lifetime (e.g., from radiation effects of uranium, potentially from TCE, TNT and from a mixture of 2,4-DNT and 2,6-DNT). The US EPA classifies the DNT mixtures to be Class B2 or probable human carcinogens, and TNT as Class C or possible human carcinogens. DNB and NB are classified as Class D or not classifiable as carcinogens. The EPA has temporarily withdrawn their previous classifications for TCE until further evaluation. TCE was classified as both causing an increase in cancer incidences

and noncancer toxicity. EPA also classifies uranium as causing cancer due to its radiation effects.

It is of vital importance to prevent or minimize exposure routes to the human population. The primary exposure route for nitrate, DNT, TNT, DNB, NB and uranium is through incidental ingestion via the gastrointestinal tract. Drinking water contaminated with TCE can expose humans via inhalation and oral pathways.

Technical documents are included as Appendix A. Since the majority of this rule is drafted for a specific area in the state, much of the available data used is based on the physical and chemical properties of the contamination present and the geology and hydrogeology of the area of concern. Consequently, availability of peer-reviewed data regarding specific standards for well construction is limited.

Drilling in areas with chemical contamination is becoming more frequent in Missouri. In the past, small isolated pockets of contamination were found near urban areas. Abandoning wells and extending city or rural water was the solution. Today, groundwater contamination is being detected in more rural areas. Many of these areas do not have access to rural water and drilling wells is the only option for obtaining drinking water. Since construction standards for potable water wells are dependent upon site specific variables, more stringent well construction standards have to be developed in order to protect deep groundwater aquifers and the public health.

3. A description of the environmental and economic costs and benefits of the proposed rule.

The rule may increase the cost of new well construction. It is estimated that few wells would be involved unless state and federal land is converted to private use. Offsetting the costs of the rule is the estimated cost of supplying public water or requiring individual water treatment systems at each well, plus the potential cost of new public wells or water treatment systems should the current source water for the local area become impacted.

4. The probable costs to the agency and to any other agency of the implementation and enforcement of the proposed rule and any anticipated effect on state revenue.

Enforcement would be a task assumed by the agency utilizing current staff and adjusting their work responsibility. No additional staff would be needed.

5. A comparison of the probable costs and benefits of the proposed rule to the probable costs and benefits of inaction, which includes both economic and environmental costs and benefits.

This rule could require a small number of new private domestic and irrigation wells to be constructed to high standards, at a greater cost, so that these wells will not utilize contaminated water or spread contamination to deeper portions of the aquifer. If this rule is not implemented, a small number of private domestic water and irrigation well users will not experience higher costs for well construction. However, there is a very high likelihood that these wells will not be able to produce clean water, and these wells may spread contamination to deeper zones of the aquifer. Allowing the contamination to move to the deeper zones would put Weldon Spring and local municipalities' public groundwater supply at risk. The public supplies would then either need to perform expensive treatment of their water to remove the contaminants, or abandon the contaminated well(s) and drill new public wells outside the area of contamination. The cost of inaction, therefore, is considered to far outweigh the cost of action.

6. A determination of whether there are less costly or less intrusive methods for achieving the proposed rule.

Supplying area residents with public water is an alternative approach for managing this problem. It is not known whether this would be less costly, however. It should be noted that many people, especially those who do not live within the city limits, do not want public water and prefer private well water. As a result, even if public water lines are extended, some people may still choose to drill their own well. Therefore, more stringent drilling standards are needed to manage the contaminated area over time.

7. A description of any alternative method for achieving the purpose of the proposed rule that were seriously considered by the department and the reasons why they were rejected in favor of the proposed rule.

The department implemented a well drilling advisory for Special Area 3 in 2002, and an updated advisory in 2004, that requested permitted well drillers voluntarily use more stringent well drilling practices in the affected areas. The department has utilized similar advisories in the past at other sites, with mixed results. Some drillers will follow the advisory for a short while, but over time compliance drops significantly. Also, some drillers will simply choose not to follow them. Because of these problems, the department believes that utilizing the rulemaking process to make the well drilling requirements enforceable is the best way of managing this long-term problem.

8. An analysis of both short-term and long-term consequences of the proposed rule.

The short- and long-term consequence of this rule will be to limit the spread of contamination and to protect the aquifer, which serves as the regional water supply. The fact that the special area designation will remain in place for a long period of time is very important, because the contamination is very persistent and may remain in place for decades. Although there is a significant amount of awareness about the groundwater contamination among Weldon Spring area

residents at present, this may not be the case many years from now. The special area designation will serve as an institutional control that will require safe drilling methods for as long as the groundwater remains contaminated.

9. An explanation of the risks to human health, public welfare or the environment addressed by the proposed rule.

The Dinitrotoluene (DNT) mixture of 2,6-DNT and 2,4-DNT is classified as a probable human carcinogen by the U.S. Environmental Protection Agency; and uranium can result in chemical and radiological toxicity in humans. As a chemical, uranium causes kidney toxicity while as a radioactive material, uranium can result in increased probability of a person developing cancer in his or her lifetime. These compounds are present in groundwater at concentrations that pose a risk to anyone that drinks the water or inhales vapors from the water during washing or showering for a relatively long period of time (such as everyday for 30 years).

10. The identification of the sources of scientific information used in evaluating the risk and a summary of such information.

EPA publishes the Code of Federal Regulations (CFRs) which relate chemical effects on human health and the environment. The Agency for Toxic Substances and Disease Registry (ATSDR) also publishes information regarding the health effects of various compounds.

11. A description and impact statement of any uncertainties and assumptions made in conducting the analysis on the resulting risk estimate.

The major uncertainty is that not all new domestic and irrigation wells would encounter and spread chemical impact. Exact extent and degree of contamination has been fully identified but rate of monitored natural remediation is not certain. Federal agencies will continue to monitor attenuation.

Whether the state and federal land will be placed in the private domain is uncertain.

In addition, the timing and the number of wells that may be drilled in the area in the future is only an estimate.

12. A description of any significant countervailing risks that may be caused by the proposed rule

Countervailing risks are unknown.

13. The identification of at least one, if any, alternative regulatory approaches that will produce comparable human health, public welfare or environmental outcomes.

Complete ban on new well construction will provide relief, although such a complete ban would be a taking and unlawful without compensation.

A city and county ordinance that either bans or restricts well drilling in the affected area might offer comparable outcome. It is not known if implementing such an ordinance is practicable in the subject area. Additionally, local ordinances are not considered as durable as state regulations.

14. Provide information on how to provide comments on the Regulatory Impact Report during the 60-day period before the proposed rule is filed with the Secretary of State

Comments will be accepted in writing, by phone, and over the Internet for 60 days after the proposed rule amendment is passed by the Well Installation Board. Notice as provided by statute will be followed.

15. Provide information on how to request a copy of comments or the web information where the comments will be located.

The DNR web site under “water issues”, “water information” and “recent news” links will be the means of collecting comments and other information.

[www.dnr.mo.gov/env/wpp/rules/wpp-rule-dev.htm](http://www.dnr.mo.gov/env/wpp/rules/wpp-rule-dev.htm) or

[www.dnr.mo.gov/regs/RuleIndex.htm](http://www.dnr.mo.gov/regs/RuleIndex.htm)

You may also submit your comments to:

Bob Archer  
PO Box 250  
Rolla, MO 65402  
(573)368-2171  
(573)368-2317 FAX

## **Appendix A**

### **Technical Documents and Data Used in Developing Proposed Rule**

#### **A. Peer-Reviewed Publications**

1. Department of Army and Department of Energy Request for Special Area Designation: Weldon Spring Sites (November 4, 2005).
2. Lindmark Engineering (2002). Risky Business: Drilling through Shallow Contaminated Plumes.  
[http://www.lindmarkengineering.com/articles/shallow\\_contam.html](http://www.lindmarkengineering.com/articles/shallow_contam.html)
3. United States Environmental Protection Agency (1995). Ground Water Issue. Nonaqueous Phase Liquids Compatibility with Materials Used in Well Construction, Sampling and Remediation. EPA/540/S-95/503

<http://www.epa.gov>

4. National Groundwater Association (2002). Grouting of Water Wells. Ground Water Protection Issue.  
<http://www.ngwa.org/ngwainwashington/issgrout.html>
5. Ministry of Water, Land and Air Protection (1982). Guidelines for Minimum Standards in Water Well Construction.  
[http://wlapwww.gov.bc.ca/wat/gws/standards/Guidelines\\_1982/standr9.html](http://wlapwww.gov.bc.ca/wat/gws/standards/Guidelines_1982/standr9.html)
6. Iowa State University (1993). Good Wells for Safe Water. Pm-840 March 1993. Extension Distribution Center, Ames, Iowa, 50011. 515-294-5247
7. Water Well Journal, Focus on Drilling: Fractured Rock Conference, April 2005, Pages 14 and 15.  
<http://www.NGWA.org>
8. Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Weldon Spring, Missouri, Site (July 2005), Chapter 3 and Appendix B  
<http://www.lm.doe.gov/land/sites/mo/weldon/weldon.htm>
9. Explanation of Significant Differences, Weldon Spring Site (February 2005)  
<http://www.lm.doe.gov/land/sites/mo/weldon/weldon.htm>

#### **B. Non-Peer Reviewed Publications**

1. None available.

#### **C. Raw Data**

1. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Ionizing Radiation, part 2: Some Internally Deposited Radionuclides (Volume 78)(14-21 June 2000)  
<http://www-cie.iarc.fr/htdocs/announcements/vol78.htm>
2. 2,4-DINITROTOLUENE, 2,6-DINITROTOLUENE AND 3,5-DINITROTOLUENE  
<http://www-cie.iarc.fr/htdocs/monographs/vol65/dinitrotoluene.htm>
3. 2,4,6-TRINITROTOLUENE  
<http://www-cie.iarc.fr/htdocs/monographs/vol65/trinitrotoluene.htm>  
[bob.archer@dnr.mo.gov](mailto:bob.archer@dnr.mo.gov)



